REMARKS

Upon receipt of this response, the Examiner is respectfully requested to contact the undersigned representative of the Applicant to arrange a telephone interview concerning the inventive merits of this application.

Please note that the corresponding European Patent was recently allowed as EP 1 648 751 B1 and a copy of allowed claims 1-11 is enclosed for consideration by the Examiner.

The present Response is filed In response to the Official Action mailed January 5, 2010 and the Applicant respectfully requests entry of the amendments and arguments presented herein before reconsideration of this application

Claims 23-32 and 34-36 are presently pending in the Application and the Examiner rejects claims 23-32 and 34-36 under 35 U.S.C. § 112, second paragraph, as being indefinite for the reasons noted in the official action. The rejected claims are accordingly amended, by the above claim amendments, and all of the presently pending claims are now believed to particularly point out and distinctly claim the subject matter regarded as the invention, thereby overcoming all of the raised § 112, second paragraph, rejections. The entered claim amendments are fully supported by the specification, drawings and claims as originally filed and do not add new matter to of alter the subject matter or scope of the invention, the disclosure or claims, are directed solely at overcoming the raised indefiniteness rejection(s) and are not directed at distinguishing the present invention from the art of record in this case.

The Examiner further rejects claims 23-32 and 34-36, under 35 U.S.C. § 103, over the previously cited U.S. Patent No. 6,231,474 to Hawarden et al., hereafter referred to as "Hawarden et al. '474" in view of Applicant's admission of prior art as described in the specification of the present Application at paragraphs [005] - [014], which comprises the Background of the Invention. The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the above amendments and the following remarks.

First considering the teachings of Hawarden et al. '474, it is noted that in the present Official Action the Examiner essentially repeats the previous interpretation of Hawarden et al. '474 and the application of Hawarden et al. '474 to the claims of the present Application as was

presented by the Examiner in the Official Action of February 27, 2009 and in the Final Official Action of July 24, 2009.

As was argued in the Responses to the Official Action of February 27, 2009 and Final Official Action of July 24, 2009, which are repeated below for purposes of convenience and for a complete record, it is the Applicant's position that the present invention as recited in the claims as presented in those Responses is fully and patentably distinguished over and from the teachings of Hawarden et al. '474 for a number of fundamental reasons.

As stated in those Responses, it is the purpose of the present invention, as stated in paragraph [013] of the present Application, to provide a method for control of an automatic transmission by which a subsequent immediate continuation of travel is always achieved with an appropriate gear stage of the transmission without having to take into consideration the disadvantage of excessive motor torque at low driving speeds or high transmission ratios in low gear stages. More specifically, and as discussed in the Responses to the Official Action of February 27 and Final Official Action of July 24, 2009, 2009, the presently claimed invention is directed to a method for operating an automatic transmission of a motor vehicle when the transmission is in a coasting mode and in anticipation of the driver's desires upon exiting the coasting mode and, in particular, to a method for executing a downshift in an automatic clutch, when the transmission is in the coasting mode without any engine braking. As recited in claims 23, 34 and 36, the method of the present invention for executing automatic transmission downshift, when the transmission is in a coasting mode, includes the steps of (a) *carrying out a first downshifting operation during a coasting mode without any engine braking*. Depending upon the speed of the vehicle after the completion of the downshift, one of (b1) *terminating the first downshifting operation by engagement of the clutch if a speed of the vehicle is above a predetermined threshold speed*; or (b2) *terminating the first downshifting operation without engagement of the clutch if the speed of the vehicle is at or below the predetermined threshold speed*. With the clutch disengaged and with a downshift occurring at a speed less than the predetermined threshold speed, this ensures that no brake torque will be generated by the drive engine in view of engaging a low transmission gear stage(s).

To reiterate and emphasize, the downshifting method of the present invention is initiated and performed only when the vehicle is initially in a *coasting mode*, that is, when the engine is not driving the wheels of the vehicle and the vehicle is not being braked in any manner, e.g., either by applying the conventional brake(s) or utilizing engine braking. Further, depending upon the vehicle speed following completion of the downshift, the clutch is either engaged (*if a speed of the vehicle is above a predetermined threshold speed*) and remains disengaged (i.e., *if the speed of the vehicle is generally at or below the predetermined threshold speed*).

Turning now to the applied art, it is respectfully submitted that Hawarden et al. '474 relates to and describes a method for controlling the engine speed at which an automatic transmission performs downshifts when and *only when the engine brake is engaged*, that is, when the engine to transmission clutch is engaged slowing the vehicle or when both the engine brake and the foot brake are both engaged.

As stated in the Responses to the Official Action of February 27, 2009 and Final Official Action of July 24, 2009, it is therefore apparent that there are a number of fundamental and patentable distinctions between the presently claimed invention, as recited in claims 23, 34 and 36 and in the associated dependent claims, and the teachings of Hawarden et al. '474. For example, the presently claimed invention is fully distinguished over and from the teachings of Hawarden et al. '474 because the method of the present invention requires the vehicle to be in a *coasting mode, not an engine braking mode of operation*. In complete contrast from the present invention as recited in the claims, the Hawarden et al. '474 method allows a downshift to be initiated and performed when and only when the driver is either using engine braking or engine braking in combination with the foot brake, which requires that the clutch located between the engine and transmission be engaged during the period immediately before a downshift. It is respectfully submitted that the Hawarden et al. '474 method, therefore, is either accelerating or engine braking and does not even contemplate a coasting mode per se, let alone a coasting mode according to the present invention in which the engine is not driving the wheels of the vehicle and the vehicle is not being braked in any manner, e.g., either by applying the conventional brake(s) or utilizing engine braking and, as a consequence of the coasting mode of operation, engine braking (or conventional braking) is not occurring.

Further in this regard, the Examiner indicates that column 4, lines 29-37 of Hawarden et al. `474 discloses performing a downshift to maximize engine brake when the vehicle is descending/coasting down hills. The Examiner stated that the Hawarden et al. `474 method performs a downshift to maximize engine braking when descending a hill. If, however, a downshift is performed to maximize engine braking when descending a hill, then the vehicle must in an engine braking mode when descending the hill–not a coasting mode–which means that a clutch between the engine and transmission must be engaged to provide the facilitate the desired engine braking. It is respectfully submitted that the vehicle, therefore, cannot be in a coasting mode–as required by the presently claimed invention–because the coasting mode requires that the engine not be driving the wheels of the vehicle and the vehicle not be braked in any manner, e.g., either by utilizing engine braking or applying the conventional brake(s). It is to be appreciated that the presently claimed coasting mode specifically means that the engine cannot be providing any engine braking–the claims now specifically recite a *coasting mode without any engine braking*.

As noted in the previous Responses, the Applicant is somewhat puzzled by the Examiner's statements and conclusion because the Examiner's statements, as worded, seem to contradict the Examiner's conclusion.

Therefore considering Hawarden et al. `474 directly and, in particular, considering column 3, line 21 through column 4, line 51 of Hawarden et al. `474, which includes the portion of Hawarden et al. `474 cited by the Examiner together with the context of the statements from Hawarden et al. `474 that were selected by the Examiner, Hawarden et al. `474 describes the downshift control as follows, with emphasis being added by the Applicant where appropriate:

> The **downshift control of the present invention to provide enhanced vehicle retardation in response to sensed actuation of the engine brake and/or engine and foot brake systems** may be seen by reference to FIG. 2. FIG. 2 is a graphical representation of shift point profiles utilized to determine when shift commands should be issued by the ECU 28 to the shift actuator 52. Solid line 60 is the default upshift profile, while solid line 62 is the default downshift profile. As is known, if the vehicle is operating to the right of upshift profile 60, an upshift of transmission 14 should be commanded, while if the vehicle is operating to the left of downshift profile 62, a downshift should be commanded. If the vehicle is operating in between profiles 60 and 62, no shifting of the transmission is then required. At or below a certain engine speed, ESD/S, a downshift will be commanded. As is discussed in detail in aforementioned U.S. Pat. No. 4,361,060, the shift profiles may be modified or moved in response to certain sensed vehicle operating conditions to provide enhanced drive line

performance. To provide enhanced vehicle retardation, the downshift profile (i.e., the engine speed ESD/L at which downshifts are commanded) is moved, as will be discussed in detail below.

Upon sensing manual actuation of the engine brake 46, the system will react to force an early downshift by shifting the downshift profile rightwardly (i.e., increasing the engine speed at which a downshift will be commanded, thereby increasing the speed of the engine upon completion of a downshift). In the example illustrated in FIG. 2, **if operation of the engine brake EB is set and/or operation of the engine brake and operation of the foot brake system is set, the downshift profile will be shifted rightwardly**, as indicated by shift profile 66. Shift profile 66 will result in an earlier downshift and a relatively elevated engine speed at completion of the forced downshift. By way of example, at lower throttle position values, if the default downshift value is about 950 RPM, the forced downshift value of profile 66 will be about 1300-1400 RPM.

If engine braking but not foot braking is set, upon forcing a downshift, the control will command a downshift to bring engine speed to about 1400-1700 RPM; **if engine braking and foot braking are set, the control will command a downshift** to bring engine speed to between about 1700-2000 RPM. Operating at such elevated engine speeds will result in enhanced engine brake effectiveness in retarding the speed of the vehicle.

If engine braking but not foot braking is set and vehicle speed is above a given value (i.e., about 30 MPH), after a forced downshift (i.e., a downshift from profile 66), the downshift profile will return to the default value 62 thereof. **If engine braking but not foot braking is set and vehicle speed is below the set value** (i.e., OS<REF), then the downshift profile is caused to assume a profile value 64 intermediate default profile 62 and the forced downshift profile 66. By way of example, if at lower throttle positions the default profile 62 value is about 950 RPM and the forced downshift profile 66 value is about 1300-1400 RPM, then the value on profile 64 will be about 1100 RPM.

If engine braking and foot braking both are set, the forced downshift profile 66 will remain effective. If the engine brake is activated, the system raises the downshift point to approximately 1300-1400 RPM (the value is two ratio steps down from the maximum engine speed). The downshift made under these conditions, if any, brings the engine speed to between 1400-1700 RPM, allowing the driver a moderate level of engine braking.

If the engine brake is pressed and the foot/service brake is pressed, or if the two are pressed together, then the system will raise the downshift point to approximately 1300-1400 RPM. The system will make a downshift, if necessary, to bring the engine speed to between 1700-2000 RPM to give a maximum level of engine braking. As the vehicle slows down, it will downshift again when it reaches the raised dsownshift point (1300-1400 RPM) and make a skip downshift to bring the engine speed up to approximately 2000 RPM.

As long as the driver keeps his foot on the engine brake (he may release the foot brake if he wishes), the system will remain in this state. While in this mode, **if the driver removes his foot from the foot brake, the system will remain in this mode**. **If the driver then reapplies the foot brake while maintaining the engine brake on**, the system will make a downshift if possible (usually a single) to raise the engine speed as high as possible. This assists in maximizing engine brake performance when descending hills.

In summary, **there are two enhanced braking states, engine-brake-only and engine-brake-plus-foot-brake. Engine-brake-only gives moderate engine speeds and a moderate level of engine braking (single shifts, skips at lower vehicle speeds). Engine-brake-plus-foot-brake gives higher engine speeds for a maximum level of engine braking** (skip shifts, though the first shift may be a single to get it into the 1700-2000-RPM range, for example, 1800-1900 RPM). The driver may switch between the two states very easily, for example, touching the foot brake while in engine-brake-only mode

changes to engine-brake-plus-foot-brake. Also, if the driver is in engine-brake-plus-foot-brake mode (foot off foot brake) and briefly releases the engine brake, he will revert to engine-brake-only mode."

It is therefore apparent from consideration of the above disclosure by Hawarden et al. '474 that the disclosed method requires that *engine braking be applied*, that is, that the clutch between the engine and transmission must be engaged so that the engine is slowing the speed of the vehicle. It is also apparent that if the vehicle is in an engine braking mode of operation, the vehicle thus cannot be in a *coasting mode* which, by all commonly accepted definitions and understanding of the term "coasting", requires that the engine is not driving the wheels of the vehicle and the vehicle is not being braked in any manner, namely, either by utilizing engine braking or applying the conventional brake(s).

The present invention as recited in the claims presently under consideration, however, requires that the downshifting method be initiated and performed when, and only when, the vehicle is initially in a coasting mode, that is, the engine is not driving the wheels of the vehicle and the vehicle is not being braked in any manner, namely, the vehicle is neither utilizing engine braking nor applying the conventional brake(s). It is therefore apparent that, instead of teaching suggesting, or disclosing the present invention under the requirements and provisions of 35 U.S.C. 102 or 35 U.S.C. 103, the teachings of Hawarden et al. '474 are in direct opposition to and contradiction of the presently claimed invention as recited in the pending claims.

In order to emphasize this distinction, however, which is already present in the claims as presented herein above by the recitation of "carrying out a first downshifting operation during a coasting mode" of the automatic transmission from a higher gear to a lower gear, the Applicant further elects to submit the above amendment to claims 23, 34 and 36, and thus also to the dependent claims, which further clarify the meaning of "in a coasting mode" by reciting that in the coasting mode occurs "without any engine braking" to specifically exclude the possibility that engine braking somehow is included as part of the coasting mode of operation. In addition, each of the independent claims now recite that the downshift terminates by "engagement of the clutch, located between the vehicle drive motor and the transmission, if a speed of the vehicle is above a predetermined threshold speed" or terminates "without engagement of the clutch, located between the vehicle drive motor and the transmission, if the speed of the vehicle is below the predetermined threshold speed." Such features are believed to clearly and patentably distinguish the presently claimed invention from all of the art of record, including the applied art. It will also be noted that these amendments are fully supported by the

specification and claims as originally filed and do not add any new matter to the present invention, the specification or the claims.

It is therefore apparent that the present invention, as recited in claims 23, 34 and 36 and thus in the associated dependent claims, is for at least the reasons discussed above, completely and fully distinguished over and from the teachings of Hawarden et al. '474 under the requirements and provisions of 35 U.S.C. 102 and 35 U.S.C. 103. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of the claims over the cited prior art, and the allowance of the claims as presented herein above.

It must also be noted that the present invention as recited in claims 23, 24 and 36, as well as the dependent claims, is still further distinguished over and from Hawarden et al. '474 because the method of Hawarden et al. '474 determines the downshift speed, that is, the speed at which a downshift should occur, as a function of the engine speed, and whether the driver is using engine braking or the combination of engine braking with foot braking.

According to the present invention, and in distinct contrast to Hawarden et al. '474, the determination of whether or not a downshift is executed is a function of not only the vehicle speed but whether or not the vehicle is in a coasting mode or not in a coasting mode. The present invention is, therefore, fully independent of either engine braking and foot braking, while Hawarden et al. '474 does not even mention or consider whether the vehicle is in a coasting mode or not.

Again, therefore, and as argued previously in the Responses to the Official Action of February 27, 2009 and Final Official Action of July 24, 2009, it is apparent that the present invention as recited in claims 23, 34 and 36, as well as the associated dependent claims, are, for at least the reasons discussed above, completely and fully distinguished over and from the teachings of Hawarden et al. '474 under the requirements and provisions of 35 U.S.C. 102 and 35 U.S.C. 103.

In this regard, the Applicant notes that the Examiner apparently concurs with at least an essential part of the above discussions regarding the distinctions between the present invention as recited in the claims and the teachings of Hawarden et al. '474 because the Examiner states, in the next to last paragraph of page 7 of the present Office Action, that "Hawarden, ..., does not explicitly state that the first downshifting operation is carrying out during a coasting mode *without any engine braking*" (Examiner's emphasis).

While the Applicant agrees with the Examiner's stated conclusion regarding the teachings of Hawarden et al. '474, the Applicant feels that the Examiner ignores or neglects to consider the further distinctions between the present invention as recited in the claims and the teachings of Hawarden et al. '474 that have been discussed above. It is the Applicant's position, however, that the present invention as recited in the claims is fundamentally distinguished over and from the teachings of Hawarden et al. '474 under the requirements and provisions of 35 U.S.C. 102 and 35 U.S.C. 103 for all of the reasons discussed above, and not only the reason stated by the Examiner.

Next considering the Examiner's citation of the "Applicant's admission of prior art as described in the specification of the present Application at paragraphs [005] - [014]", which comprises the Background of the Invention of the present Specification, it is the Applicant's belief and position that the Examiner has misinterpreted either or both of the discussions of the prior art found in the Background of the Invention or the distinctions between the prior art discussed in the Background of the Invention and the invention as described in the Summary of the Invention, the Detailed Description of the Invention, and the claims.

First considering paragraphs {005]-[014] of the Background of the Invention, which are quoted below with certain passages emphasized, paragraphs [005]-[014] states (emphasis added):

> [006] A multiplicity of methods is known to experts with regard to the operation of automatic transmissions. In the present case, the emphasis is on controlling problems involved with such transmissions, which occur especially in connection with compression downshifting. In the case of compression downshifting of the type pertinent here, during a continual reduction of speed of an unpowered, but still traveling vehicle, i.e., coasting against the compression of the motor, shifting is carried out from high transmission gearing to a succession of lower gearings. To accommodate this action, in an already known manner, regulated actuators are energized by a transmission control apparatus, wherein actuators select the succession of gear stages and also can activate shifts into a starting clutch as well as a cut-out clutch in the transmission.

[007] Compression downshifting is particularly of value in descents from mountains to take advantage of the braking torque of a vehicle motor so that, simultaneously, the operational brakes of the vehicle need not be too severely loaded. In addition, by way of a choice of transmission gearing, which is compliant with the actual speed, assurance is provided that at the termination of the down-hill downshifting phase, while the clutch is closed, the correct gear is found to be engaged, which will serve well for a continuing positive vehicle acceleration.

[008] Moreover, in normal operation of a motor vehicle, it is possible for a driving situation in which this downshifting can occur to achieve a continually reduced driving speed when approaching a traffic blockage, a suddenly closed railroad crossing or a traffic light which has turned red. During such an operational phase, it may happen that engine braking torque, in a case of a suddenly engaged small gear stage, would produce a stopping power far in excess of that required.

[009] On the account of the above, in the case of multi-stage, automatic transmissions, frequent downshifting into compliant speed related gear stages is not actually carried out, in the case of downshifting while running against motor compression. In order not to allow the high motor compression braking torque in the low gear stages to react adversely on the vehicle in such transmissions, compression downshifting into the smaller gears can only be permitted up to the time that a predetermined threshold vehicle speed has been attained. Below this speed limitation, the most recently engaged gear (most likely a high gear) is kept closed and the driving speed in this gear is further reduced by the closed clutch.

[010] Upon attaining an idling speed of rotation of the driving motor, the clutch is opened in order to prevent stalling. The vehicle then rolls with the open clutch and in a high gear stage until the vehicle comes to a stillstand and subsequently the proper starting clutch is engaged.

[011] However, if the vehicle does not come to a standstill because at that moment, a traffic light suddenly turns green, for example, by subsequent activation of the power control member of the drive motor, a downshift is enacted from the presently engaged high transmission gear stage into such a gear stage as

enables further travel in accordance with its complementary driving speed.

[012] This mode of driving brings with it a disadvantage of the operation of an automatic transmission, namely that a relatively long time must pass to achieve the release of the former gear, to engage the new gear, close the clutch and have the vehicle react with the desired acceleration.

[013] Giving consideration to this background and in a case of a compression downshifting, it is the purpose of the invention to introduce a method for the control of an automatic transmission by way of the operation of which a subsequent immediate continuation of travel is always achieved by an appropriate gear stage in the transmission without having to take into consideration a disadvantage of excessive motor torque at low driving speeds and high transmission ratios in low gear stages."

It is apparent from the description contained in the above paragraphs of the specification cited by the Examiner, as comprising an admission of prior art, that such passages do not, in fact, teach, suggest or disclose the present invention but instead only describes the problems of the prior art that the present invention, in contrast to the described prior art, addresses and resolves. More specifically, and in summary, the cited paragraphs [005]-[0014] of the Background of the Invention describe transmission systems of the prior art as not allowing downshifting operations during a compression braking mode of operation, that is, while the vehicle is being braked by engine compression by engagement of the transmission clutch, to thereby prevent the sudden occurrence of excessive compression braking force caused by a downshift into a lower gear. As described in paragraphs [005]-[014], the transmissions of the prior art instead maintain the clutch and the transmission in the engaged state, and in the same initial transmission gear ratio, until the vehicle speed decreases to a predetermined threshold speed that corresponds to the engine idle speed at the current transmission gear ratio. At that point, and in order to avoid stalling the engine, the clutch is disengaged and the vehicle is allowed to coast, now without any engine compression braking, until the vehicle stops or until the vehicle resumes travel. At that point, and because the

transmission has not previously downshifted to a lower gear ratio, the transmission must shift to a suitable lower gear ratio before again engaging the clutch so that the vehicle can resume forward motion.

As described in the summary and detailed description of the invention, for example, in paragraphs [016]-[019] of the pending specification, however, and in fundamental and inventive contrast from the prior art in paragraphs [005]-[014] as cited by the Examiner, the present invention provides a method for controlling a transmission to perform downshifting operations while the speed of a vehicle is decreasing by disengaging the transmission clutch, so that there is no engine compression braking, and performing at least one downshift operation as the vehicle speed decreases. At each downshift operation, however, the system will re-engage the transmission clutch at the end of the downshift operation if the speed of the vehicle is above a predetermined threshold speed or will maintain the clutch in the disengage state at the end of the downshift operation if the speed of the vehicle is below the predetermined threshold speed.

It is therefore apparent that the method of the present invention is completely and fundamentally distinguished over and from the prior art as described in paragraphs [005]-[014] of the specification, and as described in Hawarden et al. '474, by permitting downshifts while the vehicle speed is decreasing while, at the same time, avoiding excessive levels of engine compression braking and eliminating or reducing the lag time required in systems of the prior art to restart movement of the vehicle when the vehicle is coasting to a stop.

It must also be noted that, as described in the specification at, for example, paragraph [017], and in complete contrast to the prior art systems described in paragraphs [005]-[014] of the specification as well as the Hawarden et al. '474 system, the predetermined threshold speed is not a function of the engine idle speed, that is, is not chosen to avoid stalling the engine, but is instead dependent upon the current gear ratio of the transmission, which further emphasizes the fundamental distinctions

between the present invention as recited in the claims and the teachings of both Hawarden et al. '474 and paragraphs [005]-[014] of the present specification.

In this regard, it will be noted that after consideration of the Examiner's remarks concerning paragraphs [005]-[014] of the present specification, and in order to advance prosecution and allowance of the present Application, independent claims 23, 34 and 36 are amended to more explicitly point out and recite the fundamental distinctions between the present invention and both Hawarden et al. '474 and paragraphs [005]-[014] of the specification by the recitation that the predetermined threshold speed recited therein is a function of the current gear ratio, rather than an engine idle speed, stalling point or some other speed employed in systems of the prior art.

It is therefore the Applicant's position that independent claims 23, 34 and 36, as well as the dependent claims, are fully and patentably distinguished over and from the teachings of Hawarden et al. '474 and the prior art described in paragraphs [005]-[014] of the pending specification, whether taken individually or in any permissible combination, under the requirements and provisions of 35 U.S.C. 103 for the reasons discussed above. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of the claims over the cited prior art, and allow the claims as presented herein above.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Hawarden et al. '474 reference and/or the admitted prior art, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should

be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

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schen einem Fahrzeugantriebsmotor und dem Getriebe angeordneten Kupplung beendet werden, gekennzeichnet durch dass Verfahrensmerkmal, dass unterhalb der Grenzgeschwindigkeit Rückschaltungen mit offener Kupplung beendet werden.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Rückschaltungen bei ständig geöffneter Kupplung nur dann durchgeführt werden, wenn eine vergleichsweise große Wahrscheinlichkeit besteht, dass der Fahrer bald den Wunsch nach einem positiven Antriebsdrehmoment, also nach einer Weiterfahrt hat.

3. Verfahren nach Anspruch 2, **dadurch gekennzeichnet, dass** der Wunsch nach einem positiven Antriebsdrehmoment mittels eines Indikators ermittelt wird.

4. Verfahren nach Anspruch 3, **dadurch gekennzeichnet, dass** als Indikator für den Wunsch nach einem positiven Antriebsdrehmoment das Lösen der Betriebsbremse, das Auslenken eines Betätigungshebels für den Fahrtrichtungsanzeiger sowie der Lenkwinkel der Fahrzeuglenkung genutzt wird.

5. Verfahren nach Anspruch 4, **dadurch gekennzeichnet, dass** das Vorliegen eines Fahrerwunsches nach einem positiven Antriebsdrehmoment durch ein Überschreiten des gemessenen Lenkwinkels gegenüber einem vorbestimmten Lenkwinkel bestimmt wird.

6. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** zur Bestimmung der Wahrscheinlichkeit des Fahrerwunsches nach einem positiven Drehmoment zwei oder mehrere der genannten oder andere Indikatoren gemeinsam genutzt werden.

7. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** Schubrückschaltungen nicht durchgeführt werden, wenn die Betriebsbremse betätigt wird.

8. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die Kupplung zur Beendigung des Schubbetriebes erst dann geschlossen wird, wenn das Leistungsstellglied des Kraftfahrzeuges betätigt wird.

9. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Einlegen des Anfahrgangs des Automatgetriebes am Ende der Schubbetriebsphase immer mit einer offenen Kupplung beendet wird.

10. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die Gangsprünge bei der Getrieberückschaltung während der Schubbetriebsphase in Abhängigkeit von der Fahrzeugverzögerung gewählt werden.

11. Verfahren nach wenigstens einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** mit diesem ein automatisiertes Handschaltgetriebe betrieben wird.

Claims

1. Method for operating an automated transmission in a motor vehicle, in which method, during an overrun mode phase until a predefined limit speed has been reached, downshifts are carried out in the transmission and are ended by closing of a clutch which is arranged between a vehicle drive engine and the transmission, **characterized by** the method feature that downshifts are ended with an open clutch below the limit speed.

2. Method according to Claim 1, **characterized in that** the downshifts are carried with a permanently open clutch only when there is a comparatively great probability that the driver will soon request a positive drive torque, that is to say will wish to drive on.

3. Method according to Claim 2, **characterized in that** the request for a positive drive torque is determined by means of an indicator.

4. Method according to Claim 3, **characterized in that** the release of the service brake, the deflection of an actuating lever for the driving-direction indicator and the steering angle of the vehicle steering system are used as indicator for the request for a positive drive torque.

5. Method according to Claim 4, **characterized in that** the presence of a driver's request for a positive drive torque is determined by the measured steering angle exceeding a predefined steering angle.

6. Method according to at least one of the preceding claims, **characterized in that** two or more of the abovementioned or other indicators are used together in order to determine the probability of the driver's request for a positive torque.

7. Method according to at least one of the preceding claims, **characterized in that** overrun downshifts are not carried out if the service brake is actuated.

8. Method according to at least one of the preceding claims, **characterized in that** the clutch is closed to end the overrun mode only when the power actuator

of the motor vehicle is activated.

9. Method according to at least one of the preceding claims, characterized in that the engagement of the starting gear of the automated transmission at the end of the overrun mode phase is always ended with an open clutch.

10. Method according to at least one of the preceding claims, characterized in that the gear increments during the transmission downshift during the overrun mode phase are selected as a function of the vehicle deceleration.

11. Method according to at least one of the preceding claims, characterized in that an automated manual transmission is operated by way of the said method.

Revendications

1. Procédé pour faire fonctionner une boîte de vitesses automatique dans un véhicule automobile, dans lequel, pendant une phase de fonctionnement en mode de poussée, jusqu'à ce qu'une vitesse limite prédéterminée soit atteinte, on effectue des rétrogradages dans la boîte de vitesses, et ils sont terminés par la fermeture d'un embrayage disposé entre un moteur d'entraînement du véhicule et la boîte de vitesses,
caractérisé par la caractéristique de procédé selon laquelle l'on termine les rétrogradages avec un embrayage ouvert en dessous de la vitesse limite.

2. Procédé selon la revendication 1, caractérisé en ce que les rétrogradages ne sont effectués lorsque l'embrayage est ouvert de manière constante que lorsqu'il existe une relativement grande probabilité que le conducteur va bientôt souhaiter avoir un couple d'entraînement positif, c'est-à-dire de continuer à rouler.

3. Procédé selon la revendication 2, caractérisé en ce que le souhait d'un couple d'entraînement positif est détecté au moyen d'un indicateur.

4. Procédé selon la revendication 3, caractérisé en ce que l'on utilise comme indicateur du souhait d'un couple d'entraînement positif, le desserrage du frein de service, la déviation d'un levier d'actionnement pour l'indicateur de direction de conduite, ainsi que l'angle de direction de la direction du véhicule.

5. Procédé selon la revendication 4, caractérisé en ce que la présence d'un souhait de couple d'entraînement positif du conducteur est déterminée par un dépassement de l'angle de direction mesuré par rapport à un angle de direction prédéterminé.

6. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce que pour déterminer la probabilité du souhait d'un couple positif du conducteur, on utilise en même temps deux ou plusieurs des indicateurs cités ou d'autres indicateurs.

7. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce que des rétrogradages en mode de poussée ne sont pas effectués lorsque le frein de service est actionné.

8. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce que l'embrayage n'est seulement fermé pour terminer le mode de poussée qu'après que l'organe de commande de puissance du véhicule automobile a été actionné.

9. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce que l'enclenchement de la vitesse de démarrage de la boîte de vitesses automatique est toujours terminé avec un embrayage ouvert à la fin de la phase de fonctionnement en mode de poussée.

10. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce que les sauts de vitesse lors du rétrogradage de vitesses sont sélectionnés pendant la phase de fonctionnement en mode de poussée en fonction de la décélération du véhicule.

11. Procédé selon au moins l'une quelconque des revendications précédentes, caractérisé en ce qu'il permet de faire fonctionner une boîte de vitesses automatisée à changement de vitesse manuel.